Remarks

Claims 1-15 are pending.

Claims 1-15 are rejected under 35 USC 103(a) as being unpatentable over Ino (US Patent No. 5,861,825) in view of Nakayama (US Patent No. 5,453,684).

It must be noted that the office action also stated that 'Claims 1-15 are rejected under 35 USC 102(b) as being anticipated by Ino.' However, in light of the explanation of the rejection, all of which involved Nakayama, it is assumed that this was a typographical error.

As stated in the office action, Ino does not teach using the quadrature signals to determine the distance and direction of a moving object. Nakayama is directed to a sensor attached to lens tube, within which is a lens having a magnet attached to it. The sensor is not attached to the moving object.

Further, neither reference, nor the combination thereof teaches 1) the use of quadrature signals, 2) the quadrature signals are from a sensor attached to a moving object, or 3) that the output takes into account any skipped states.

With regard to the first point, a pair of quadrature signals provides one of four possible digital outputs. See Applicant's specification on page 1, lines 15-17. The signals used in Ino are not quadrature signals, but modulated, 16-bit codes that are to be converted to 20-bit signals. There is no pair of quadrature signals, nor is that pair of signals sampled. See Ino, col. 5, lines 3-10. In Nakayama, the signals are not quadrature signals, but two analog waveforms having a gain and an offset that have an infinite number of outputs. See Nakayama, col. 5, lines 1-39. Therefore, the combination of references does not teach quadrature signals.

In neither reference, is the sensor attached to a moving object. In Ino, this is admitted in the office action. In Nakayama, the sensor is in a fixed position, and the magnet attached to the moving object is tracked using magneto resistance. Having a fixed position to which a

sensor is attached is far different than having a sensor on the moving object itself. Therefore, the combination of references does not teach that the quadrature signals are from a sensor on a moving object.

With regard to the third point, neither Ino nor Nakayama deal with skipped states. Nakayama, not using quadrature signals, does not rely on states at all. The states used in Ino are not related to the movement of an object, but to the contents of a code. See Ino, col. 7, lines 21-40 in which the transitions across a pre-determined state map based upon transitions in the 16-bit code generate a 20-bit code. In Nakayama, the process is specifically slowed down to avoid any inaccurate data. While Nakayama does not use states, it would be similar to slowing down a process to avoid skipped states. See Nakayama, col. 6, lines 20-25.

As amended, claims 1, 8 and 13 requires that the sensor be on a moving object, that the sensor provide quadrature signals for sampling, and that the resulting output take into account any skipped states.

It is therefore submitted that claims 1, 8 and 13 are patentably distinguishable over the prior art and allowance of these claims is requested.

Claims 2-7 depend from claim 1, claims 9-12 depend from claim 8 and claims 14-15 depend from claim 13. These claims inherently contain all of the limitations of their respective base claims. As discussed above, the prior art does not teach, show nor suggest all of the limitations of the base claim, much less the further embodiments of the dependent claims. It is therefore submitted that claims 2-7, 9-12 and 14-15 are patentably distinguishable over the prior art and allowance of these claims is requested.

The prior art made of record and not relied upon has been reviewed and is not considered pertinent to applicant's disclosure. No new matter has been added by this amendment. Allowance of all claims is requested. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

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Respectfully submitted,

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